

attachment to  
Page #14

s glutamine synthetase?  
4473 GLUTAMINE  
1581 SYNTHETASE?  
L1 52 GLUTAMINE SYNTHETASE?  
(GLUTAMINE (W) SYNTHETASE?)

=> s 11 and vector?  
39660 VECTOR?  
L2 22 L1 AND VECTOR?

=> d cit,ti,1-22

1. 5,284,755, Feb. 8, 1994, DNA encoding leukemia inhibitory factor receptors; David P. Gearing, et al., 435/69.1, 69.7, 252.3, 320.1; 536/23.4, 23.5 [IMAGE AVAILABLE]

US PAT NO: 5,284,755 [IMAGE AVAILABLE] L2: 1 of 22  
TITLE: DNA encoding leukemia inhibitory factor receptors

2. 5,276,268, Jan. 4, 1994, Phosphinothricin-resistance gene, and its use; Eckhard Strauch, et al., 800/205; 435/172.3, 240.4, 252.3; 536/23.7; 800/255, DIG.43; 935/67 [IMAGE AVAILABLE]

US PAT NO: 5,276,268 [IMAGE AVAILABLE] L2: 2 of 22  
TITLE: Phosphinothricin-resistance gene, and its use

3. 5,273,894, Dec. 28, 1993, Phosphinothricin-resistance gene, and its use; Eckhard Strauch, et al., 435/129, 128, 172.3, 193, 240.4, 252.3; 536/23.2, 23.7 [IMAGE AVAILABLE]

US PAT NO: 5,273,894 [IMAGE AVAILABLE] L2: 3 of 22  
TITLE: Phosphinothricin-resistance gene, and its use

4. 5,266,683, Nov. 30, 1993, Osteogenic proteins; Hermann Uppermann, et al., 530/326, 327, 328, 350, 395, 840 [IMAGE AVAILABLE]

US PAT NO: 5,266,683 [IMAGE AVAILABLE] L2: 4 of 22  
TITLE: Osteogenic proteins

5. 5,256,558, Oct. 26, 1993, Gene encoding plant asparagine synthetase; Gloria M. Coruzzi, et al., 435/240.1, 172.3, 252.3, 252.33, 320.1; 536/23.2, 24.1 [IMAGE AVAILABLE]

US PAT NO: 5,256,558 [IMAGE AVAILABLE] L2: 5 of 22  
TITLE: Gene encoding plant asparagine synthetase

6. 5,145,777, Sep. 8, 1992, Plant cells resistant to herbicidal \*\*glutamine\*\* \*\*synthetase\*\* inhibitors; Howard M. Goodman, et al., 435/172.3, 69.1, 240.4, 320.1; 504/206, 319, 320, 322; 536/23.2, 23.6; 800/200, 205, 255; 935/33, 35 [IMAGE AVAILABLE]

US PAT NO: 5,145,777 [IMAGE AVAILABLE] L2: 6 of 22  
TITLE: Plant cells resistant to herbicidal \*\*glutamine\*\*  
\*\*synthetase\*\* inhibitors

7. 5,137,816, Aug. 11, 1992, Rhizobial diagnostic probes and rhizobium trifolii nifH promoters; Barry G. Rolfe, et al., 435/172.3, 252.2, 252.3, 320.1, 878; 536/23.6, 23.71; 935/41, 72 [IMAGE AVAILABLE]

US PAT NO: 5,137,816 [IMAGE AVAILABLE] L2: 7 of 22

TITLE: Rhizobial diagnostic probes and rhizobium trifolii nifH promoters

8. 5,122,464, Jun. 16, 1992, Method for dominant selection in eucaryotic cells; Richard H. Wilson, et al., 435/172.3, 320.1 [IMAGE AVAILABLE]

US PAT NO: 5,122,464 [IMAGE AVAILABLE] L2: 8 of 22

TITLE: Method for dominant selection in eucaryotic cells

9. 5,098,838, Mar. 24, 1992, Expression of wild type and mutant \*\*glutamine\*\* \*\*synthetase\*\* in foreign hosts; Howard Goodnan, et al., 435/183, 252.3, 252.33, 320.1; 536/23.2, 23.6; 935/10, 27, 29, 66, 67, 72, 73 [IMAGE AVAILABLE]

US PAT NO: 5,098,838 [IMAGE AVAILABLE] L2: 9 of 22

TITLE: Expression of wild type and mutant \*\*glutamine\*\*  
\*\*synthetase\*\* in foreign hosts

10. 5,098,703, Mar. 24, 1992, Interferon-alpha 76; Michael A. Innis, 424/85.7; 435/69.51, 811; 530/351; 536/23.52 [IMAGE AVAILABLE]

US PAT NO: 5,098,703 [IMAGE AVAILABLE] L2: 10 of 22

TITLE: Interferon-alpha 76

11. 5,077,399, Dec. 31, 1991, Phosphinothricin-resistance gene; Dieter Brauer, et al., 536/23.7; 435/252.1, 320.1, 829 [IMAGE AVAILABLE]

US PAT NO: 5,077,399 [IMAGE AVAILABLE] L2: 11 of 22

TITLE: Phosphinothricin-resistance gene

12. 5,043,270, Aug. 27, 1991, Intronic overexpression \*\*vectors\*\*; John M. Abrams, et al., 435/69.1, 172.3, 240.1, 320.1; 536/23.2, 23.5; 935/34, 61, 66, 70, 71, 79, 84 [IMAGE AVAILABLE]

US PAT NO: 5,043,270 [IMAGE AVAILABLE] L2: 12 of 22

TITLE: Intronic overexpression \*\*vectors\*\*

13. 5,008,194, Apr. 16, 1991, nifH promoters of Bradyrhizobium; Barry G. Rolfe, et al., 435/172.3, 252.2, 252.3, 320.1; 536/23.6, 24.1; 935/6, 35, 41 [IMAGE AVAILABLE]

US PAT NO: 5,008,194 [IMAGE AVAILABLE] L2: 13 of 22

TITLE: nifH promoters of Bradyrhizobium

14. 5,001,061, Mar. 19, 1991, nifD promoter of Bradyrhizobium; Barry G. Rolfe, et al., 435/172.3, 252.2, 252.3, 320.1; 536/23.1, 23.6, 24.2; 935/6, 35, 41 [IMAGE AVAILABLE]

US PAT NO: 5,001,061 [IMAGE AVAILABLE] L2: 14 of 22

TITLE: nifD promoter of Bradyrhizobium

15. 4,975,374, Dec. 4, 1990, Expression of wild type and mutant \*\*glutamine\*\* \*\*synthetase\*\* in foreign hosts; Howard Goodnan, et al., 435/172.3, 183, 252.3, 252.33; 536/23.2, 23.6; 935/14, 29, 30, 73 [IMAGE AVAILABLE]

US PAT NO: 4,975,374 [IMAGE AVAILABLE] L2: 15 of 22

TITLE: Expression of wild type and mutant \*\*glutamine\*\*  
\*\*synthetase\*\* in foreign hosts

16. 4,975,276, Dec. 4, 1990, Interferon-alpha, Michael A. Innis, 424/85.7, 85.4; 435/69.51, 811; 530/351 [IMAGE AVAILABLE]

US PAT NO: 4,975,276 [IMAGE AVAILABLE] L2: 16 of 22  
TITLE: Interferon-alpha 54

17. 4,973,479, Nov. 27, 1990, Interferon-.alpha.61; Michael A. Innis, 424/85.7, 85.4; 435/69.51, 811; 530/351 [IMAGE AVAILABLE]

US PAT NO: 4,973,479 [IMAGE AVAILABLE] L2: 17 of 22  
TITLE: Interferon-.alpha.61

18. 4,966,843, Oct. 30, 1990, Expression of interferon genes in Chinese hamster ovary cells; Francis P. McCormick, et al., 435/69.51, 70.1, 70.3, 70.5, 172.1, 172.3, 240.2, 320.1, 811; 536/23.5, 23.52, 24.1; 935/11, 34, 70 [IMAGE AVAILABLE]

US PAT NO: 4,966,843 [IMAGE AVAILABLE] L2: 18 of 22  
TITLE: Expression of interferon genes in Chinese hamster ovary cells

19. 4,956,288, Sep. 11, 1990, Method for producing cells containing stably integrated foreign DNA at a high copy number, the cells produced by this method, and the use of these cells to produce the polypeptides coded for by the foreign DNA; James G. Barsoun, 435/172.3, 69.1, 70.1, 71.1, 172.1, 252.3; 935/16, 33, 52 [IMAGE AVAILABLE]

US PAT NO: 4,956,288 [IMAGE AVAILABLE] L2: 19 of 22  
TITLE: Method for producing cells containing stably integrated foreign DNA at a high copy number, the cells produced by this method, and the use of these cells to produce the polypeptides coded for by the foreign DNA

20. 4,803,165, Feb. 7, 1989, Nif promoter of fast-growing rhizobium japonicum; Edward R. Appelbaum, 435/172.3, 69.1, 252.2, 252.33, 320.1; 536/23.6, 23.7, 23.71, 24.1; 935/29, 30, 41, 56, 64, 67, 72 [IMAGE AVAILABLE]

US PAT NO: 4,803,165 [IMAGE AVAILABLE] L2: 20 of 22  
TITLE: Nif promoter of fast-growing rhizobium japonicum

21. 4,782,022, Nov. 1, 1988, Nitrogen fixation regulator genes; Alfred Puhler, et al., 435/172.3, 252.2, 252.33, 320.1; 536/23.2, 23.6, 23.71, 24.1; 930/200; 935/29, 56, 72 [IMAGE AVAILABLE]

US PAT NO: 4,782,022 [IMAGE AVAILABLE] L2: 21 of 22  
TITLE: Nitrogen fixation regulator genes

22. 4,594,323, Jun. 10, 1986, Hybrid DNA conferring osmotic tolerance; Laszlo N. Csonka, et al., 435/172.3, 107, 252.3, 320.1; 536/23.2; 935/14, 29, 60 [IMAGE AVAILABLE]

US PAT NO: 4,594,323 [IMAGE AVAILABLE] L2: 22 of 22  
TITLE: Hybrid DNA conferring osmotic tolerance

=> d cit,ti,ab,pro,9

9. 5,098,838, Mar. 24, 1992, Expression of wild type and mutant \*\*glutamine\*\* \*\*synthetase\*\* in foreign hosts; Howard Goodman, et al., 435/183, 252.3, 252.33, 320.1; 536/23.2, 23.6; 935/10, 27, 29, 66, 67,

US PAT NO: 5,098,838 [IMAGE AVAILABLE] L2: 9 of 22  
 TITLE: Expression of wild type and mutant \*\*glutamine\*\*  
 \*\*synthetase\*\* in foreign hosts

## ABSTRACT:

The invention relates to a mutant \*\*glutamine\*\* \*\*synthetase\*\* (GS) enzyme which is resistant to inhibition by herbicidal GS inhibitors, such as phosphinothricin (PPT), genetic sequences coding therefor, plants cells and prokaryotes transformed with the genetic sequences, and herbicidal GS inhibitor-resistant plant cells and plants.

US PAT NO: 5,098,838 [IMAGE AVAILABLE] L2: 9 of 22  
 DATE ISSUED: Mar. 24, 1992  
 TITLE: Expression of wild type and mutant \*\*glutamine\*\*  
 \*\*synthetase\*\* in foreign hosts  
 INVENTOR: Howard Goodman, Newton, MA  
 Shiladitya DasSarma, Acherst, MA  
 Edmund Tischer, Palo Alto, CA  
 Theresa K. Peterman, Cambridge, MA  
 ASSIGNEE: The General Hospital Corporation, Boston, MA (U.S. corp.)  
 DISCL-DATE: Dec. 4, 2007  
 APPL-NO: 07/556,434  
 DATE FILED: Jul. 24, 1990  
 REL-US-DATA: Continuation of Ser. No. 10,612, Feb. 4, 1987. Pat. No.  
 4,975,374, which is a continuation-in-part of Ser. No.  
 840,744, Mar. 18, 1986, abandoned, and a  
 continuation-in-part of Ser. No. 906,984, Sep. 15, 1986,  
 abandoned.  
 INT-CL: [5] C12N 9/00; C12N 15/29; C12N 15/70; C12N 15/84  
 US-CL-ISSUED: 435/183, 320.1, 252.3, 252.33; 536/27; 935/10, 27, 29, 66,  
 67, 72, 73  
 US-CL-CURRENT: 435/183, 252.3, 252.33, 320.1; 536/23.2, 23.6; 935/10, 27,  
 29, 66, 67, 72, 73  
 SEARCH-FLD: 435/320, 69.1-69.9, 172.1-172.3, 252.3-252.35, 320.1, 183  
 REF-CITED:

## U.S. PATENT DOCUMENTS

4,594,323	6/1986	Csonka et al.	435/107
4,975,374	12/1990	Goodman et al.	435/172.3

## OTHER PUBLICATIONS

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 European Search Report for Application (EP 87103936.8) which corresponds  
 to parent case.  
 Tingey, S. V. et al., Plant Physiol. 84:366-373 (1987).  
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Tischer, E. et al., Mol. Gen. Genet. 203:221-224 (1986).  
Sambrook, J. et al., Molecular Cloning: A Laboratory Manual, Cold Spring  
Harbor Laboratory Press 1989, pp. 1.85-1.86.  
Gebhardt, C. et al., EMBO J. 5:1425-1435 (1986).  
ART-UNIT: 185  
PRIM-EXMR: Richard A. Schwartz  
ASST-EXMR: William W. Moore  
LEGAL-REP: Sterne, Kessler, Goldstein & Fox

ABSTRACT:

The invention relates to a mutant \*\*glutamine\*\* \*\*synthetase\*\* (GS)  
enzyme which is resistant to inhibition by herbicidal GS inhibitors, such  
as phosphinothricin (PPT), genetic sequences coding therefor, plants  
cells and prokaryotes transformed with the genetic sequences, and  
herbicidal GS inhibitor-resistant plant cells and plants.

18 Claims, 20 Drawing Figures

=> begin 5,6,55,biotech.medicine,biosci,152,153,154e au=Wilson, Richard H.

Ref Items Index-term

E1 12 AU=WILSON, RICHARD H.  
E2 5 AU=WILSON, RICHARD H., PH.D.  
E3 8 AU=WILSON, RICHARD HANSEL  
E4 2 AU=WILSON, RICHARD HARRIS  
E5 1 AU=WILSON, RICHARD HOWARD.  
E6 13 AU=WILSON, RICHARD J.  
E7 6 AU=WILSON, RICHARD J. H.  
E8 2 AU=WILSON, RICHARD JOHN H.  
E9 3 AU=WILSON, RICHARD JOHN HUGH  
E10 1 AU=WILSON, RICHARD K  
E11 23 AU=WILSON, RICHARD K.  
E12 4 AU=WILSON, RICHARD KEVIN

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S1 12 AU="WILSON, RICHARD H."

?d s1/3/1-12

Display 1/3/1 (Item 1 from file: 399)

119021289 CA: 119(3)21289s CONFERENCE PROCEEDING

Glutamine synthetase gene amplification in Chinese hamster ovary cells

AUTHOR(S): Wilson, Richard H.

LOCATION: Univ. Glasgow, Glasgow, UK,

JOURNAL: Gene Amplif. Magn. Cells EDITOR: Kellens, Rodney E (Ed),

DATE: 1993 PAGES: 301-11 CODEN: 58VCAS LANGUAGE: English PUBLISHER:

Dekker, New York, N. Y

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Display 1/3/2 (Item 2 from file: 399)

117085250 CA: 117(9)85250p PATENT

Synergistic norflurazon and dinitroaniline herbicide mixtures

INVENTOR(AUTHOR): Wilson, Richard H.; Short, Kevin I.

LOCATION: USA

PATENT: United States ; US 5108484 A DATE: 920428

APPLICATION: US 416096 (891002)  
PAGES: 6 pp. CODEN: USXXAM LANGUAGE: English CLASS: 071092000;  
A01N-043/58A

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Display 1/3/3 (Item 3 from file: 399)

109104650 CA: 109(21)104650k JOURNAL  
Nucleotide sequence of rat glutamine synthetase mRNA  
AUTHOR(S): Van de Zande, Louis; Labruyere, Wil Th.; Soaling, Maria M.;  
Moorman, Antoon F. M.; Wilson, Richard H.; Charles, Robert; Lamers, Wouter  
H.  
LOCATION: Dep. Anat. Embryol., Univ. Amsterdam, Amsterdam, Neth.  
JOURNAL: Nucleic Acids Res. DATE: 1988 VOLUME: 16 NUMBER: 15 PAGES:  
7726 CODEN: NARHAD ISSN: 0305-1048 LANGUAGE: English

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Display 1/3/4 (Item 4 from file: 399)

108017031 CA: 108(3)17031q JOURNAL  
Sequence of a human glutamine synthetase cDNA  
AUTHOR(S): Gibbs, Craig S.; Campbell, Karen E.; Wilson, Richard H.  
LOCATION: Dep. Genet., Univ. Glasgow, Glasgow, UK, G11 5JS  
JOURNAL: Nucleic Acids Res. DATE: 1987 VOLUME: 15 NUMBER: 15 PAGES:  
6293 CODEN: NARHAD ISSN: 0305-1048 LANGUAGE: English

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Display 1/3/5 (Item 5 from file: 399)

107211996 CA: 107(23)211996v JOURNAL  
Insulin and dexamethasone stimulate transcription of an amplified  
glutamine synthetase gene in Chinese hamster ovary cells  
AUTHOR(S): Bhandari, Basant; Wilson, Richard H.; Miller, Richard E.  
LOCATION: Dep. Med., Veterans Adm. Med. Cent., Cleveland, OH, 44106, USA  
JOURNAL: Mol. Endocrinol. DATE: 1987 VOLUME: 1 NUMBER: 6 PAGES: 403-7  
CODEN: MUENEN ISSN: 0888-8809 LANGUAGE: English

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Display 1/3/6 (Item 6 from file: 399)

104103419 CA: 104(13)103419p JOURNAL  
Selection of a rat glutamine synthetase cDNA clone  
AUTHOR(S): Burns, Douglas M.; Bhandari, Basant; Short, Jay M.; Sanders,  
Peter G.; Wilson, Richard H.; Miller, Richard E.  
LOCATION: Dep. Med., VA Med. Cent., Cleveland, OH, 44106, USA  
JOURNAL: Biochem. Biophys. Res. Commun. DATE: 1986 VOLUME: 134  
NUMBER: 1 PAGES: 146-51 CODEN: BBRC99 ISSN: 0006-291X LANGUAGE:  
English

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Display 1/3/7 (Item 7 from file: 399)

100133495 CA: 100(17)133495v JOURNAL

Amplification and cloning of the Chinese hamster glutamine synthetase gene

AUTHOR(S): Sanders, Peter G.; Wilson, Richard H.

LOCATION: Inst. Gent., Univ. Glasgow, Glasgow, UK, G11 5JS

JOURNAL: EMBO J. DATE: 1984 VOLUME: 3 NUMBER: 1 PAGES: 65-71 CODEN:

EMJODG ISSN: 0261-4189 LANGUAGE: English

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Display 1/3/8 (Item 8 from file: 399)

100117445 CA: 100(15)117445y JOURNAL

'ZSTATS' - a statistical analysis for potential Z-DNA sequences

AUTHOR(S): Vass, J. Keith; Wilson, Richard H.

LOCATION: Beatson Inst. Cancer Res., Glasgow, UK, G61 1BD

JOURNAL: Nucleic Acids Res. DATE: 1984 VOLUME: 12 NUMBER: 1, Pt. 2

PAGES: 825-32 CODEN: NARHAD ISSN: 0305-1048 LANGUAGE: English

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Display 1/3/9 (Item 9 from file: 399)

86136400 CA: 86(19)136400o JOURNAL

Effect of phosphoenolpyruvate and oxaloacetate on calcium ion uptake by isolatedmung bean mitochondria

AUTHOR(S): Graesser, Robert J.; Wilson, Richard H.

LOCATION: Ciba-Geigy Corp., Greenville, Miss.

JOURNAL: Plant Physiol. DATE: 1977 VOLUME: 59 NUMBER: 2 PAGES: 126-8

CODEN: PLPHAY LANGUAGE: English

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Display 1/3/10 (Item 10 from file: 399)

81163970 CA: 81(25)163970c JOURNAL

Rapid inhibition of auxin-induced elongation of Avena coleoptile segments by cordycepin

AUTHOR(S): Cline, Morris G.; Reho, Marilyn M.; Wilson, Richard H.

LOCATION: Dep. Bot., Ohio State Univ., Columbus, Ohio

JOURNAL: Plant Physiol. DATE: 1974 VOLUME: 54 NUMBER: 2 PAGES: 160-3

CODEN: PLPHAY LANGUAGE: English

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78080240 CA: 78(13)80240b JOURNAL

Effects of valinonycin on respiration and volume changes in plant  
mitochondria

AUTHOR(S): Wilson, Richard H.; Dever, John; Harper, Walter; Fry, Robert

LOCATION: Dep. Bot., Univ. Texas, Austin, Tex.

JOURNAL: Plant Cell Physiol. DATE: 1972 VOLUME: 13 NUMBER: 6 PAGES:  
1103-11 CODEN: PCPHAS LANGUAGE: English

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S2 7498 GLUTAMINE SYNTHETASE?

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S4 0 S2 AND RECOMBINANT? EXPRESSI? VECTOR?

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7498 S2

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S6 0 S5 AND EXPRESS? VECTOR?

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